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09/925,579	08/09/2001	Akira Nakano	9281-4140	2869
7590 Brinks Hofer Gilson & Lione P.O. Box 10395 Chicago, IL 60610			EXAMINER ZERVIGON, RUDY	
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

**Application No.**

09/925,579

**Applicant(s)**

NAKANO ET AL.

**Examiner**

Rudy Zervigon

**Art Unit**

1792

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 21 May 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-8, 64, 65, 67, 68 and 71-87 is/are pending in the application.
- 4a) Of the above claim(s) 1-8, 64, 65, 67 and 68 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 74-87 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/C)
- Paper No(s)/Mail Date 5/21/2008
- 4) ☐ Interview Summary (PTO-413)
- Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on October 4, 2007 has been entered.

### ***Claim Rejections - 35 USC § 102/103***

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claims 74-79, and 81 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Murata et al (USPat. 5,423,915) in view of Patrick (USPat. 5,474,648). Murata teaches a plasma processing apparatus (Figure 1; column 5; line 44 - column 6; line 11) comprising: a plasma processing chamber (1; Figure 1; column 5; line 44 - column 6; line 11) having a plasma excitation electrode (2; Figure 1; column 5; line 44 - column 6; line 11) for exciting a plasma; a radio frequency generator (4; Figure 1; column 5; line 44 - column 6; line 11) for supplying a radio frequency voltage to the electrode (2; Figure 1; column 5; line 44 - column 6; line 11); a radio frequency feeder (105; Figure 1; column 5; line 44 - column 6; line 11) connected to the electrode (2; Figure 1; column 5; line 44 - column 6; line 11); a matching circuit (104; Figure 1; column 5; line 44 - column 6; line 11) having an input terminal (104/4 interface; Figure 1; column 5; line 44 - column 6; line 11) and an output (106, 109; Figure 1; column 5; line 44 - column 6; line 11) end, wherein the input terminal

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(104/4 interface; Figure 1; column 5; line 44 - column 6; line 11) is connected to the radio frequency generator (4; Figure 1; column 5; line 44 - column 6; line 11) and the output (106, 109; Figure 1; column 5; line 44 - column 6; line 11) end is connected to an end of the radio frequency feeder (105; Figure 1; column 5; line 44 - column 6; line 11) so as to achieve impedance matching between the plasma processing chamber (1; Figure 1; column 5; line 44 - column 6; line 11) and the radio frequency generator (4; Figure 1; column 5; line 44 - column 6; line 11) – claim 1.

Applicant's claim 1 limitations of

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a set of electrical radio frequency factors of the plasma processing chamber configured such that at an end of the radio frequency feeder a frequency, which is three times a first series resonant frequency  $f_0$  of the plasma processing chamber, is larger than a power frequency  $f_e$  of the radio frequency waves at the end of the radio frequency feeder, wherein the first series resonant frequency  $f_0$  is based on the measured impedance of the path from the radio frequency feeder to the ground via a shaft and a variable oscillation frequency when the plasma processing chamber is disconnected from the matching circuit, and the first series resonant frequency  $f_0$  corresponds to a minimum impedance of the plasma processing chamber when the plasma chamber is disconnected from the plasma apparatus during a non-discharge period.

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all appear to be a claim recitation of intended use in the pending apparatus claims. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter, 618 F.2d at 769, 205 USPQ at

409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto, 136 USPQ 458, 459 (CCPA 1963); MPEP 2111.02).

Murata further teaches that at least one of the shape of a feed plate (105; Figure 1; column 5; line 44 - column 6; line 11), the overlap area (column 8; lines 45-59) of the plasma excitation electrode and a chamber wall, insulation material between the plasma excitation electrode and the chamber wall, or the capacitance (column 8; lines 45-59) between a susceptor electrode and the chamber wall are considered result-effective variables for film thickness distribution and film forming speed as taught by Murata (column 8; lines 45-59).

Applicant's following claim limitations, not taught by Murata, but are also believed to be intended use requirements of the pending apparatus claims:

- i. A plasma processing apparatus (Figure 1; column 5; line 44 - column 6; line 11) according to claim 74, wherein a frequency of 1.3 times the first series resonant frequency  $f_0$  is larger than a power frequency  $f_e$ , as claimed by claim 75
- ii. A plasma processing apparatus (Figure 1; column 5; line 44 - column 6; line 11) according to claim 75, wherein the first series resonant frequency  $f_0$  is larger than three times the power frequency  $f_e$ , as claimed by claim 76
- iii. A plasma processing apparatus (Figure 1; column 5; line 44 - column 6; line 11) according to claim 76, wherein a series resonant frequency  $f_0'$  which is defined by a capacitance between the plasma excitation electrode (2; Figure 1; column 5; line 44 -

column 6; line 11) and a counter electrode (2; Figure 1; column 5; line 44 - column 6; line 11) for generating the plasma in cooperation with the plasma excitation electrode (2; Figure 1; column 5; line 44 - column 6; line 11), is larger than three times the power frequency  $f_c$ , as claimed by claim 77

- iv. A plasma processing apparatus (Figure 1; column 5; line 44 - column 6; line 11) according to claim 77, wherein the plasma excitation electrode (2; Figure 1; column 5; line 44 - column 6; line 11) and the counter electrode (2; Figure 1; column 5; line 44 - column 6; line 11) are of a parallel plate type, and the series resonant frequency  $f_0'$  and the power frequency  $f_c$  satisfy the relationship:

$f_0' > \sqrt{\frac{d}{\delta}} f_c$  wherein  $d$  represents the distance between the plasma excitation electrode (2; Figure 1; column 5; line 44 - column 6; line 11) and the counter electrode (3; Figure 1; column 5; line 44 - column 6; line 11), and  $\delta$  represents the sum of the distance between the plasma excitation electrode (2; Figure 1; column 5; line 44 - column 6; line 11) and the generated plasma and the distance between the counter electrode (3; Figure 1; column 5; line 44 - column 6; line 11) and the generated plasma, as claimed by claim 78.

Murata further does not teach:

- v. A plasma processing apparatus (Figure 1; column 5; line 44 - column 6; line 11) according to claim 74, further comprising a resonant frequency measuring terminal for measuring a resonant frequency of the plasma processing chamber (1; Figure 1; column 5; line 44 - column 6; line 11), in the vicinity of the end of the radio frequency feeder (105; Figure 1; column 5; line 44 - column 6; line 11), as claimed by claim 79

- vi. A plasma processing apparatus (Figure 1; column 5; line 44 - column 6; line 11) according to claim 79, further comprising a resonant frequency measuring unit which is detachably connected to the resonant frequency measuring terminal, as claimed by claim

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In the event that Murata is deemed not to anticipate the claims, Patrick (USPat. 5,474,648) teaches a plasma reactor (104, Figure 2a; column 6; line 54 – column 7; line 25) including a variable RF parameter sensor (202; Figure 2a) which measures power, voltage, current, phase angle, harmonic content (abstract), and impedance parameters at the plasma chamber electrode (112; Figure 2a, claim 5). That Patrick et al measures a frequency, resonant or otherwise, at the plasma chamber electrode is inherent because the applied frequency is that of the dynamic voltage and current that are measured and dynamically controlled (claim 6). The Examiner believes Patrick's apparatus is inherent in setting a frequency  $f_0$  corresponding desired, or optimized values, including "corresponding" a minimum impedance (as measured by Patrick) of the plasma processing chamber. That Patrick can measure the minimum impedance with the plasma chamber disconnected from the plasma apparatus during a non-discharge period, is a claim requirement of intended use. See above.

Patrick further teaches that his plasma processing apparatus (Figure 2a; column 6; line 54 – column 7; line 25) produces frequencies which is defined by a capacitance between the plasma excitation electrode (112; Figure 2a) and a counter electrode (114; Figure 2a) for generating the plasma in cooperation with the plasma excitation electrode (112; Figure 2a). Further when the structure recited in the references is substantially identical to that of the claims, claimed properties or functions are presumed to be inherent. Where the claimed and prior art products are

identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a prima facie case of either anticipation or obviousness has been established. In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA1977) – MPEP 2114.

In the event that Murata is deemed not to anticipate the claims, it would have been obvious to one of ordinary skill in the art at the time the invention was made for Murata to use Patrick et al's system for plasma dynamic control including optimizing the relative frequencies between Murata's plasma excitation electrode and Murata's radio frequency generator depending on the geometry of the plasma chamber and dynamic processing conditions.

Motivation for Murata to use Patrick et al's system is for plasma dynamic control including optimizing the relative frequencies between Murata's plasma excitation electrode and Murata's radio frequency generator depending on the geometry of the plasma chamber and dynamic processing conditions is for enabling the repeatability and uniformity of plasma processing as taught by Patrick et al (column 3; lines 55-65) and Murata (column 8; lines 45-59).

It would be obvious to those of ordinary skill in the art to optimize the operation of the claimed invention (In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980); In re Hoeschele , 406 F.2d 1403, 16<sub>0</sub> USPQ 809 (CCPA 1969); Merck & Co. Inc . v. Biocraft Laboratories Inc. , 874 F.2d 804, 1<sub>0</sub> USPQ2d 1843 (Fed. Cir.), cert. denied , 493 U.S. 975 (1989); In re Kulling , 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990), MPEP 2144.05).

4. Claims 82-84 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murata et al (USPat. 5,423,915) in view of Patrick (USPat. 5,474,648) and Hoke; William E. et al. (US 5077875 A). Murata and Patrick are discussed above. Murata further teaches a plasma



processing apparatus (Figure 1; column 5; line 44 - column 6; line 11) comprising: a plasma processing chamber (1; Figure 1; column 5; line 44 - column 6; line 11) having a plasma excitation electrode (2; Figure 1; column 5; line 44 - column 6; line 11) for exciting a plasma, a counter electrode (2; Figure 1; column 5; line 44 - column 6; line 11), and the counter electrode (2; Figure 1; column 5; line 44 - column 6; line 11); a radio frequency generator (4; Figure 1; column 5; line 44 - column 6; line 11) for supplying a radio frequency voltage to the plasma excitation electrode (2; Figure 1; column 5; line 44 - column 6; line 11); a radio frequency feeder (105; Figure 1; column 5; line 44 - column 6; line 11) connected to the plasma excitation electrode (2; Figure 1; column 5; line 44 - column 6; line 11); and a matching circuit (104; Figure 1; column 5; line 44 - column 6; line 11) having an input terminal (104/4 interface; Figure 1; column 5; line 44 - column 6; line 11) and an output (106, 109; Figure 1; column 5; line 44 - column 6; line 11) end, wherein the input terminal (104/4 interface; Figure 1; column 5; line 44 - column 6; line 11) is connected to the radio frequency generator (4; Figure 1; column 5; line 44 - column 6; line 11) and the output (106, 109; Figure 1; column 5; line 44 - column 6; line 11) end is connected to an end of the radio frequency feeder (105; Figure 1; column 5; line 44 - column 6; line 11) so as to achieve impedance matching between the plasma processing chamber (1; Figure 1; column 5; line 44 - column 6; line 11) and the radio frequency generator (4; Figure 1; column 5; line 44 - column 6; line 11) – claim 82.

As described above, Applicant's claim 82 requirements of:

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wherein a frequency which is three times a first series resonant frequency  $f_0$  of the plasma processing chamber (1; Figure 1; column 5; line 44 - column 6; line 11) which is measured at the

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end of the radio frequency feeder (105; Figure 1; column 5; line 44 - column 6; line 11) is larger than a power frequency  $f_e$  of the radio frequency waves, and wherein the first series resonant frequency  $f_0$  is determined by disconnecting the chamber from the rest of the system so that the chamber is in a non-discharge state and then measuring impedance of the path from the feed plate (105; Figure 1; column 5; line 44 - column 6; line 11) to the ground via the shaft with an impedance meter while varying the oscillation frequency, the first series resonant frequency  $f_0$  corresponding to a minimum impedance of the plasma processing chamber (1; Figure 1; column 5; line 44 - column 6; line 11), the minimum impedance evaluated with the plasma chamber disconnected from the plasma apparatus during a non- discharge period

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Are believed to be intended use of the pending apparatus claims. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963); MPEP 2111.02).

When the structure recited in the reference is substantially identical to that of the claims, claimed properties or functions are presumed to be inherent (In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977); MPEP 2112.01).

Murata and Patrick do not teach:

- i. a shower plate disposed between the plasma excitation electrode (2; Figure 1; column 5; line 44 - column 6; line 11) – claim 82
- ii. The plasma processing apparatus (Figure 1; column 5; line 44 - column 6; line 11) according to claim 82, wherein the plasma excitation electrode (2; Figure 1; column 5; line 44 - column 6; line 11) comprises an overlapping area with respect to the chamber wall, the overlapping area *adapted* to set the first series resonant frequency  $f_0$  such that three times the first series resonant frequency  $f_0$  is larger than a power frequency  $f_e$  supplied from the radio frequency generator (4; Figure 1; column 5; line 44 - column 6; line 11), as claimed by claim 83.
- iii. The plasma processing apparatus (Figure 1; column 5; line 44 - column 6; line 11) according to claim 82, wherein the radio frequency feeder (105; Figure 1; column 5; line 44 - column 6; line 11) has a length *adapted* to set the first series resonant frequency  $f_0$  such that three times the first series resonant frequency  $f_0$  is larger than a power frequency  $f_e$  supplied from the radio frequency generator (4; Figure 1; column 5; line 44 - column 6; line 11), as claimed by claim 84

Hoke teaches a cross flow deposition reactor (Figure 3) similar to Murata's cross flow deposition reactor (7; Figure 1). In particular, Hoke teaches a shower plate (12; Figure 3) at the gas introduction point (15; Figure 3) in the reactor (11; Figure 3).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Murata to use Patrick et al's system for plasma dynamic control including optimizing the relative frequencies between Murata's plasma excitation electrode and Murata's radio frequency

generator depending on the geometry of the plasma chamber and dynamic processing conditions, further, for Murata and Patrick to add Hoke's shower plate (12; Figure 3).

Motivation for Murata to use Patrick et al's system for plasma dynamic control including optimizing the relative frequencies between Murata's plasma excitation electrode and Murata's radio frequency generator depending on the geometry of the plasma chamber and dynamic processing conditions is for enabling the repeatability and uniformity of plasma etching processes as taught by Patrick et al (column 3; lines 55-65), motivation Murata and Patrick to add Hoke's shower plate is for process gas diffusion under laminar flow as taught by Hoke (column 7; lines 54-65).

It would be obvious to those of ordinary skill in the art to optimize the operation of the claimed invention (In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980); In re Hoeschele, 406 F.2d 1403, 16 USPQ 809 (CCPA 1969); Merck & Co. Inc. v. Biocraft Laboratories Inc., 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989); In re Kulling, 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990), MPEP 2144.05).

5. Claims 85-87 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murata et al (USPat. 5,423,915). Murata teaches a plasma processing apparatus (Figure 1; column 5; line 44 - column 6; line 11) comprising: a plasma processing chamber (1; Figure 1; column 5; line 44 - column 6; line 11) having a first series resonant frequency  $f_0$  and a plasma excitation electrode (2; Figure 1; column 5; line 44 - column 6; line 11) for exciting a plasma; a radio frequency generator (4; Figure 1; column 5; line 44 - column 6; line 11) for supplying a radio frequency voltage to the electrode (2; Figure 1; column 5; line 44 - column 6; line 11); a radio frequency feeder (105; Figure 1; column 5; line 44 - column 6; line 11) connected to the electrode (2;

Figure 1; column 5; line 44 - column 6; line 11); and a matching circuit (104; Figure 1; column 5; line 44 - column 6; line 11) having an input terminal (104/4 interface; Figure 1; column 5; line 44 - column 6; line 11) and an output (106, 109; Figure 1; column 5; line 44 - column 6; line 11) end, wherein the input terminal (104/4 interface; Figure 1; column 5; line 44 - column 6; line 11) is connected to the radio frequency generator (4; Figure 1; column 5; line 44 - column 6; line 11) and the output (106, 109; Figure 1; column 5; line 44 - column 6; line 11) end is connected to an end of the radio frequency feeder (105; Figure 1; column 5; line 44 - column 6; line 11) so as to achieve impedance matching between the plasma processing chamber (1; Figure 1; column 5; line 44 - column 6; line 11) and the radio frequency generator (4; Figure 1; column 5; line 44 - column 6; line 11) – claim 85

As described above, Applicant's claim 85 requirements of

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wherein the first series resonant frequency  $f_0$  corresponds to a minimum impedance of the plasma processing chamber (1; Figure 1; column 5; line 44 - column 6; line 11), the minimum impedance evaluated with the plasma chamber disconnected from the plasma apparatus during a non-discharge period

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Are believed to be claim requirements of intended use in the pending apparatus claims. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the

claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto, 136 USPQ 458, 459 (CCPA 1963); MPEP 2111.02).

When the structure recited in the reference is substantially identical to that of the claims, claimed properties or functions are presumed to be inherent (In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977); MPEP 2112.01).

However, Murata does not teach the claim 85 limitation of:

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wherein at least one of the *shape* of a feed plate (105; Figure 1; column 5; line 44 - column 6; line 11), the overlapping area of the plasma excitation electrode (2; Figure 1; column 5; line 44 - column 6; line 11) and a chamber wall, insulation material between the plasma excitation electrode (2; Figure 1; column 5; line 44 - column 6; line 11) and the chamber wall, **or** the capacitance between a susceptor electrode (2; Figure 1; column 5; line 44 - column 6; line 11) and the chamber wall is adjusted such that three times the first series resonant frequency  $f_0$  is larger than a power frequency  $f_e$  supplied from the radio frequency generator (4; Figure 1; column 5; line 44 - column 6; line 11).

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Likewise, Murata further does not teach the limitation of:

- i. The plasma processing apparatus (Figure 1; column 5; line 44 - column 6; line 11) according to claim 85, wherein at least one of the *shape* of a feed plate (105; Figure 1; column 5; line 44 - column 6; line 11), the overlapping area of the plasma excitation electrode (2; Figure 1; column 5; line 44 - column 6; line 11) and a chamber wall,

insulation material between the plasma excitation electrode (2; Figure 1; column 5; line 44 - column 6; line 11) and the chamber wall, or the capacitance between a susceptor electrode (2; Figure 1; column 5; line 44 - column 6; line 11) and the chamber wall is adjusted such that 1.3 times the first series resonant frequency  $f_0$  is larger than a power frequency  $f_e$ , as claimed by claim 86.

- ii. The plasma processing apparatus (Figure 1; column 5; line 44 - column 6; line 11) according to claim 86, wherein at least one of the *shape* of a feed plate (105; Figure 1; column 5; line 44 - column 6; line 11), the overlapping area of the plasma excitation electrode (2; Figure 1; column 5; line 44 - column 6; line 11) and a chamber wall, insulation material between the plasma excitation electrode (2; Figure 1; column 5; line 44 - column 6; line 11) and the chamber wall, or the capacitance between a susceptor electrode (2; Figure 1; column 5; line 44 - column 6; line 11) and the chamber wall is adjusted such that the first series resonant frequency  $f_0$  is larger than a power frequency  $f_e$ , as claimed by claim 87

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Murata to optimize the size/dimension of Murata's apparatus.

Motivation for Murata to optimize the size/dimension of Murata's apparatus is for plasma dynamic control including optimizing the relative frequencies between Murata's plasma excitation electrode and Murata's radio frequency generator depending on the geometry of the plasma chamber and dynamic processing conditions is for enabling the repeatability and uniformity of plasma processing as taught by Murata (column 8; lines 45-59). Further, it is well established that changes in apparatus dimensions are within the level of ordinary skill in the

art.(Gardner v. TEC Systems, Inc. , 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied , 469 U.S. 830, 225 USPQ 232 (1984); In re Rose , 220 F.2d 459, 105 USPQ 237 (CCPA 1955); In re Rinehart, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); See MPEP 2144.04)

6. Claim 80 is rejected under 35 U.S.C. 103(a) as being unpatentable over Murata et al (USPat. 5,423,915) and Patrick (USPat. 5,474,648) in view of Stramke (USPat. 4,645,981). Murata and Patrick are discussed above. Murata and Patrick do not teach that Murata's plasma processing apparatus (Figure 1; column 5; line 44 - column 6; line 11) according to claim 79, further comprising a switch provided between the radio frequency feeder (105; Figure 1; column 5; line 44 - column 6; line 11) and the resonant frequency measuring terminal, wherein the switch electrically disconnects the end of the radio frequency feeder (105; Figure 1; column 5; line 44 - column 6; line 11) from the resonant frequency measuring terminal and connects the end of the radio frequency feeder (105; Figure 1; column 5; line 44 - column 6; line 11) to the output (106, 109; Figure 1; column 5; line 44 - column 6; line 11) end of the matching circuit (104; Figure 1; column 5; line 44 - column 6; line 11) - claim 80.

Applicant's claim 80 limitations of "a plasma excitation mode in which the plasma is excited, whereas the switch electrically connects the end of the radio frequency feeder (105; Figure 1; column 5; line 44 - column 6; line 11) to the resonant frequency measuring terminal and disconnects the end of the radio frequency feeder (105; Figure 1; column 5; line 44 - column 6; line 11) from the resonant frequency measuring terminal in a measuring mode in which the resonant frequency of the plasma processing chamber (1; Figure 1; column 5; line 44 - column 6; line 11) is measured" are claim requirements of intended use in the pending apparatus claims. Further, it has been held that claim language that simply specifies an intended use or field of use



for the invention generally will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02).

Stramke teaches a capacitive plasma processing apparatus (Figure 1; column 3; line 57 – column 4, line 19) including a switch (“S1”; Figure 1; column 3; line 57 – column 4, line 19) for a current sensor (12; Figure 1; column 3; line 57 – column 4, line 19).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Murata and Patrick to add a switch to the RF parameter sensor as taught by Stramke.

Motivation for Murata and Patrick to add a switch to the RF parameter sensor as taught by Stramke is to allow for current sampling durations as taught by Stramke (column 4; lines 46-50).

#### ***Response to Arguments***

7. Applicant's arguments filed April 7, 2008 have been fully considered but they are not persuasive.

8. Applicant's arguments take the position that the Examiner's claim analysis assigning intended use arguments to the intended use claim portions are no longer relevant based on the fact that the pending claims “have been written in method claim format”. In response, the Examiner notes Applicant's own April 7, 2008 amendment withdrawing method claims in response to the Examiner's December 13, 2007 written restriction requirement. As a result,

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Applicant's April 7, 2008 arguments do not address the pending arguments based on the non-withdrawn apparatus claims.

***Conclusion***

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Rudy Zervigon whose telephone number is (571) 272-1442. The examiner can normally be reached on a Monday through Friday schedule from 9am through 5pm. The official fax phone number for the 1792 art unit is (571) 273-8300. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (571) 272-1700. If the examiner can not be reached please contact the examiner's supervisor, Parviz Hassanzadeh, at (571) 272-1435

/Rudy Zervigon/

Primary Examiner, Art Unit 1792

**Application Number****Application/Control No.**

09/925,579

**Applicant(s)/Patent under  
Reexamination**

NAKANO ET AL.

**Examiner**

Rudy Zervigon

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